

Name

KEY

## Algebra 2 CP Midterm Review 2014-2015

Review Unit

1. Simplify:  $\left(\frac{2x}{5}\right)^2$

$$\frac{4x^2}{25}$$

2. Simplify:  $(2x^3y^6)(x^2y)^5$

$$2x^3y^6(x^{10}y^5)$$

$$2x^{13}y^{11}$$

3. Simplify:  $(2x^{-4}y^2)^3$

$$2^3(x^{-4})^3(y^2)^3$$

$$8x^{-12}y^6$$

$$\frac{8y^6}{x^{12}}$$

4. Simplify:  $(4x^{-2})^2(x^{-2})^4$

$$16x^{-4} \cdot x^{-8}$$

$$16x^{-12}$$

$$\frac{16}{x^{12}}$$

Unit 1 Radicals

Simplify:

7.  $\sqrt{32}$

$$\sqrt{16 \cdot 2}$$

$$4\sqrt{2}$$

8.  $\sqrt{54}$

$$\sqrt{9 \cdot 6}$$

$$3\sqrt{6}$$

9.  $3\sqrt{7x^3} \cdot 2\sqrt{21x^3y^2}$

$$6\sqrt{147x^6y^2}$$

$$6\sqrt{49 \cdot 3x^6y^2}$$

$$6(7)x^3y\sqrt{3} = 42x^3y\sqrt{3}$$

10.  $(4-2\sqrt{3})(4+2\sqrt{3})$

$$16 + 8\sqrt{3} - 8\sqrt{3} - 4\sqrt{9}$$

$$16 + -4(3)$$

$$16 - 12 = 4$$

11.  $5\sqrt{27} - 4\sqrt{48} - \sqrt{75}$

$$5\sqrt{9 \cdot 3} - 4\sqrt{16 \cdot 3} - \sqrt{25 \cdot 3}$$

$$5 \cdot 3\sqrt{3} - 4 \cdot 4\sqrt{3} - 5\sqrt{3}$$

$$15\sqrt{3} - 16\sqrt{3} - 5\sqrt{3}$$

$$-6\sqrt{3}$$

12.  $6\sqrt{18} + 3\sqrt{50}$

$$6\sqrt{9 \cdot 2} + 3\sqrt{25 \cdot 2}$$

$$6 \cdot 3\sqrt{2} + 3 \cdot 5\sqrt{2}$$

$$18\sqrt{2} + 15\sqrt{2}$$

$$33\sqrt{2}$$

13.  $\frac{\sqrt{x}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$$\frac{\sqrt{2x}}{2}$$

14.  $\frac{\sqrt{96}}{\sqrt{8}}$

$$\sqrt{12}$$

$$\sqrt{4 \cdot 3}$$

$$2\sqrt{3}$$

15.  $\frac{5}{(2+\sqrt{5})} \cdot \frac{(2-\sqrt{5})}{(2-\sqrt{5})}$

$$\frac{10-5\sqrt{5}}{2^2-(\sqrt{5})^2} = \frac{10-5\sqrt{5}}{4-5}$$

$$\frac{10-5\sqrt{5}}{-1} = -10+5\sqrt{5}$$



Unit 2 Complex Numbers16. Reduce  $i^7$ 

$$i^7 = i^3 = -i$$

$$32 \div 4 = 8$$

no remainder

17. Reduce  $-3i^{32}$ 

$$\begin{aligned} -3i^{32} &= -3(i^4)^8 \\ &= -3(1) \\ &= -3 \end{aligned}$$

18. Simplify:  $\sqrt{-64}$ 

$$\sqrt{-1(64)} = 8i$$

19. Add and subtract:  $(-5 + 3i) + (9 + 5i) - (-7 - 8i)$ 

$$\begin{aligned} -5 + 3i + 9 + 5i + 7 + 8i \\ 11 + 16i \end{aligned}$$

20. Subtract:  $(3 - 4i) - (5 + 9i)$ 

$$3 - 4i - 5 - 9i = -2 - 13i$$

21. Multiply:  $-2i(4i - 8)$ 

$$\begin{aligned} -8i^2 + 16i \\ -8(-1) + 16i \\ 8 + 16i \end{aligned}$$

22. Multiply:  $(3 - 9i)(5 + i)$ 

$$\begin{aligned} 15 + 3i - 45i - 9i^2 \\ 15 - 42i - 9(-1) \\ 15 - 42i + 9 \\ 24 - 42i \end{aligned}$$

23. Multiply:  $(5 + 2i)^2$ 

$$\begin{aligned} (5 + 2i)(5 + 2i) \\ 25 + 10i + 10i + 4i^2 \\ 25 + 20i - 4 \\ 21 + 20i \end{aligned}$$

24. What is the sum of  $3 + 2i$  and the conjugate of:  $21 - 19i$ 

$$3 + 2i + 21 + 19i = 24 + 21i$$

25. Simplify:  $\frac{(9 - 2i)(5 - 3i)}{(5 + 3i)(5 - 3i)}$ 

$$\begin{aligned} \frac{45 - 27i - 10i + 6i^2}{25 + 9} \\ \frac{45 - 37i + 6(-1)}{34} = \frac{39 - 37i}{34} \\ 45 - 37i - 6 \end{aligned}$$

26. Simplify:  $\frac{5(2 - 3i)}{(-2 + 3i)(-2 - 3i)}$ 

$$\begin{aligned} \frac{-10 - 15i}{(-2)^2 + (3)^2} = \frac{-10 - 15i}{4 + 9} \\ = \frac{-10 - 15i}{13} \end{aligned}$$

Unit 3 Factoring Polynomials

Factor Completely:

27.  $9x^2 - 36$ 

$$\begin{aligned} 9(x^2 - 4) \\ 9(x - 2)(x + 2) \end{aligned}$$

28.  $x^2 - 16$ 

$$(x - 4)(x + 4)$$

29.  $4x^2 - 169$ 

$$\begin{aligned} \sqrt{4x^2} = 2x \\ \sqrt{169} = 13 \\ (2x - 13)(2x + 13) \\ (2x - 13)^2 \end{aligned}$$



Factor Completely:

x	+
-15	-2
-5	3
-2	-2

30.  $3x^2 - 2x - 5$

$$3x^2 - 5x + 3x - 5 = 0$$

$$x(3x-5) + 1(3x-5)$$

$$(x+1)(3x-5)$$

33.  $12x^2 - 16x - 35$

420	76
-2920	1
-30	14
-16	

$$(12x^2 - 30x) + (14x - 35)$$

$$6x(2x-5) + 7(2x-5)$$

$$(6x+7)(2x-5)$$

Units 4 Intro to Functions36. Is the following relation a function?  $\{(-8, 3), (8, 4), (-5, 3), (5, 3), (4, 4), (-4, 4)\}$ 

YES x does not repeat

37. Is the inverse of this relation a function?  $\{(-8, 3), (8, 4), (-5, 3), (5, 3), (4, 4), (-4, 4)\}$ 

$$\{(3, -8), (4, 8), (3, -5), (3, 5), (4, 4), (4, -4)\}$$

38. If  $g(x) = x^2 + 7x - 6$ , find  $g(5)$

$$g(5) = 5^2 + 7(5) - 6$$

$$g(5) = 25 + 35 - 6$$

$$g(5) = 54$$

40. If  $f(x) = -2x^3 + 5x^2 - x + 3$ , find  $f(-x)$

$$f(-x) = -2(-x)^3 + 5(-x)^2 - (-x) + 3$$

$$= -2(-x^3) + 5(x^2) + x + 3$$

$$= 2x^3 + 5x^2 + x + 3$$

42. If  $f(x) = \frac{x^2 - 8}{x^2}$ , find  $f(x+1)$

$$f(x+1) = \frac{(x+1)^2 - 8}{(x+1)^2}$$

31.  $16x^2 - 9y^2$

$$(4x-3y)(4x+3y)$$

32.  $25x^2 + 36y^2$

not factorable

must be -

34.  $3x^2 + 24x + 45$

135	24
5	27
15	9
32	

35.  $k^4 - 1$

$$(k^2-1)(k^2+1)$$

$$(k-1)(k+1)(k^2+1)$$

$$3x^2 + 15x + 9x + 45$$

$$3x(x+5) + 9(x+5) = (3x+9)(x+5)$$

$$3(x+3)(x+5)$$

39. If  $f(x) = -x^4 - 7x^2 + x$ , find  $f(-1)$

$$f(-1) = -(-1)^4 - 7(-1)^2 + (-1)$$

$$= -1(1) - 7(1) + -1$$

$$= -1 - 7 - 1$$

$$= -9$$

41. If  $f(x) = -2x^3 + 5x^2 - x + 3$ , find  $-f(x)$

$$\frac{x^2 + 2x + 1 - 8}{x^2 + 2x + 1} = \frac{x^2 + 2x - 7}{x^2 + 2x + 1}$$



Given the functions:  $f(x) = 1 + 6x$  and  $g(x) = -5x - 2$ ,

43. Find  $(f + g)(x)$ .

$$\begin{aligned}(f + g)(x) &= \underline{1 + 6x} + \underline{-5x - 2} \\ &= \underline{-1 + x} \\ &= \underline{x - 1}\end{aligned}$$

45. Find  $(f \cdot g)(x)$ .

$$\begin{aligned}(1 + 6x)(-5x - 2) \\ -5x - 2 - 30x^2 - 12x \\ -30x^2 - 17x - 2\end{aligned}$$

44. Find  $(f - g)(x)$ .

$$\begin{aligned}&= (1 + 6x) - (-5x - 2) \\ &= \underline{1 + 6x} + \underline{5x + 2} \\ &= \underline{11x + 3}\end{aligned}$$

46. Find  $(f \div g)(x)$ .

$$= \frac{1 + 6x}{-5x - 2}$$

47. What is the domain and range of the following function?

$$\{(-9, -11), (6, 3), (1, 16), (0, 2), (-2, -3), (7, 4)\}$$

$$D = \{-9, -2, 0, 1, 6, 7\}$$

$$R = \{-11, -3, 2, 3, 4, 16\}$$

48. Given  $f(x) = 1 - x$  and  $g(x) = 5x - 3$ , find  $g(f(2))$ .

$$f(2) = 1 - 2$$

$$f(2) = -1$$

$$g(f(2)) = g(-1) = 5(-1) - 3$$

$$= -5 - 3$$

$$g(f(2)) = -8$$

49. Given  $f(x) = 2x - 7$  and  $g(x) = x^2 + 3x$ , find  $(f \circ g)(x)$ .

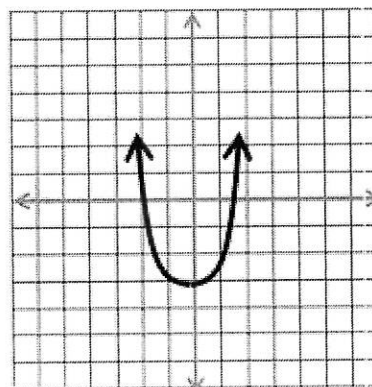
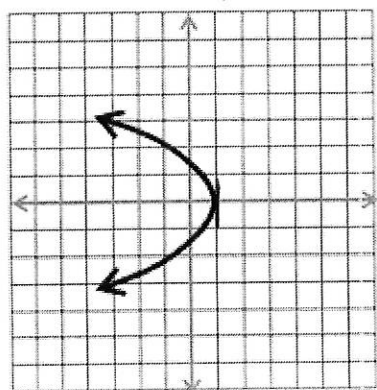
Put  $g$  into  $f$

$$\begin{aligned}(f \circ g)(x) &= f(g(x)) = 2(x^2 + 3x) - 7 \\ &= 2x^2 + 6x - 7\end{aligned}$$

47. Find the domain and range of the functions below.

$L \rightarrow R$

bottom  $\rightarrow$  top



$$D: (-\infty, 0]$$

$$R: (-\infty, \infty) \text{ any real}$$

$$D: (-\infty, \infty)$$

$$R: [-3, \infty)$$

any real





**Unit 5 Functions**48.) Find the inverse of  $f(x) = 3x + 2$ 

$$y = 3x + 2$$

$$x = 3y + 2$$


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$$\frac{3y}{3} = \frac{x-2}{3}$$

$$y = \frac{x}{3} - \frac{2}{3}$$

$$y = \frac{1}{3}x - \frac{2}{3}$$

49.) Find the inverse of  $f(x) = 3x - 3$ 

$$y = 3x - 3$$

$$x = 3y - 3$$

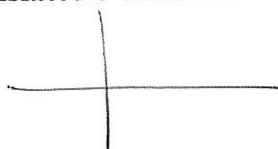
$$x - 3 = 3y$$

$$\frac{3y}{3} = \frac{x-3}{3}$$

$$y = \frac{1}{3}x - 1$$

50.) Let  $g(x)$  be any function. Find the equation of the graph that will be obtained if the graph of  $y = g(x)$  is translated 5 units to the left and 7 units down.

$$y = x^2$$



$$y = (x+5)^2 - 7$$

51.) Which test is used to determine if the graph of a function is one-to-one? Explain.

vertical line test

52.) Identify the transformation from  $f$  to  $g$ .

$$f(x) = x^2 \text{ and } g(x) = 7x^2$$

narrows

53.) Identify the transformation from  $f$  to  $g$ .

$$f(x) = x^2 \text{ and } g(x) = x^2 + 8$$

up 8

54.) Identify the transformation from  $f$  to  $g$ .

$$f(x) = |x| \text{ and } g(x) = |x + 2|$$

left 2

55.) Identify the transformation from  $f$  to  $g$ .

$$f(x) = |x| \text{ and } g(x) = \frac{2}{3}|x|$$

wider

